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FUNCTIONAL OUTCOME OF MAITLAND MOBILISATION WITH STATIC STRENGTHENING EXERCISE ON PAIN AND STRENGTH IN OSTEOARTHRITIS KNEE

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ABSTRACT:

Background:

Arthritis is a disease that causes inflammation in one or more of your joints.Pain, swelling, and stiffness are the most frequent symptoms of arthritis. The disease can affect any joint in the body, but it is especially common in the knee.Osteoarthritis progresses over time, and the pain it causes worsens. Nearly 6% of all adults suffer from osteoarthritis. Women are impacted more than males[1].

Purpose:

Osteoarthritis can lead to pain and loss of function.The popular belief that if you have osteoarthritis, you should take it easy on your knees is incorrect: strong muscles stabilise and protect joints. Exercise ensures that the cartilage in the joints receives nutrition. Decreased strength in the muscle group involving the joints which it causes significant progressive loss of function. Women are symptomatically evaluated with severe knee OA than men and sex differences increase with age > 55 years [2]. A lot of study has been conducted on the effect of Maitland mobilization and hip abductor strengthening exercise separately on pain and increase in the movements in the patients with osteoarthritis knee joint. However what would be the effect if the above mentioned treatment techniques are given in combination is not worked on.

Method: The sample size taken was 78 as per the inclusion and exclusion criteria. The outcome measures used were Knee injury and Osteoarthritis Outcome Score (KOOS), The Oxford scale for MMT, NPRS for pain. Pre and post intervention scores were measured/assessed.

Result: Baseline data such as NPRS; MMT; KOOS were documented before and after intervention and R software was used to find out the significant difference in pain and functional outcome pre and post Maitland Mobilization and static strengthening in osteoarthritis knee. The data were compared using paired t-test. The findings showed significant statistical significance of the observed difference in each outcome measure with $p<0.001$.

Conclusion: It was inferred that for individuals with knee osteoarthritis, isometric strengthening exercises, Maitland manual therapy reduced pain intensity, improved joint functioning, and enabled activities of daily living with better efficiency.

INTRODUCTION:

Osteoarthritis is a multifactorial entity that includes several causative factors such as Trauma, Mechanical forces, Inflammation, Biochemical responses and Metabolic disturbances [3,4].Nearly 6% of all adults suffer from osteoarthritis.

OA can lead to pain and loss of function. Symptomatic knee OA affects about 10% of males and 13% of women over the age of 60 [11]. Women are not only more likely than males to have OA, but they also have more severe OA [12].The clear increase in OA in women around menopause has led researchers to speculate that hormonal variables may play a role in OA development.

Osteoarthritis knee joint is the most common type of osteoarthritis and the leading cause of disability that impacts the elderly and the middle-aged worldwide [5].The cartilage in the knee joint eventually wears away in osteoarthritis. The cartilage gets ragged and harsh as it wears away, and the protecting area between the bones shrinks. Due to bone pressing against bone, this might result in painful bone spurs. Knee OA was shown to be prevalent in 28.7% of people [13].

A knee joint damaged by arthritis can be painful and inflamed. Pain and swelling may be worse in the morning or after sitting severely limiting your daily activities. The knee joint can also become stiffer and more tender to the touch making it difficult to bend and straighten the knee. Loss of Range of Motion is a common problem faced by patients due to pain or stiffness.

It's vital to understand the role of bone in the etiology of osteoarthritis (OA), as well as cartilage and synovium. Not only does bone play a role in the distribution of biomechanical forces across the joint, but it also plays a role in the progression of OA in ways that are only now becoming apparent[14-19].

Changes to the non-cartilaginous components of the joint, such as the joint capsule, synovium, subchondral bone, ligaments, and peri-articular muscles, are the primary source of pain [20, 21].

Synovitis (infiltration of inflammatory cells into the synovium) is a common OA finding that can occur early in the disease but becomes more common as the disease progresses and is linked to severity [22]. Multiple inflammatory mediators have been found in the synovial fluid of people with OA, including C-reactive

protein,PGE2, LKB4, TNF, IL1, IL6, IL15, IL17, IL18, IL21,TGF, FGFs, VEGF, NGF, nitric oxide [22, 23]. Articular cartilage is normally maintained in a healthy equilibrium of chemical reactions, however, when OA starts to develop the reactions are disrupted leading to changes in the collagen of the cartilage [24, 25].

Patients with OA knees, particularly those with varus malalignment, showed larger peak adduction moments than the general population [26, 27].

The severity and course of the disease are similarly connected to the adduction moment; higher adduction moments are associated with a faster pace of disease progression [28, 29].

According to one study, hip abductor muscle strength counteracts pelvic drop in the contralateral swing limb during the single-limb stance phase of locomotion, which helps to reduce knee adduction moments. This intensifies forces at the medial compartment of

knee of the stance limb [30, 31].

MANAGEMENT:

Different manual therapy techniques and strengthening exercises have been used separately for alleviation of pain and improvement of physical function in patients with knee osteoarthritis (KOA).

However, no study has reported the effect of combination of these treatment modalities in the management of KOA.

In neurophysiological effects, small oscillatory amplitude and distraction motion are used to boost mechano-receptors which can prevent the transmission of nociceptive stimuli at the level of the spinal cord or brainstem [6-9]. Gentle Joint mobilization can be used by stimulating neurophysiological and mechanical effects to treat pain and muscle guarding.

Manual mobilization has been shown to be useful in increasing PPT in patients with KOA among numerous therapies. Maitland technique relieved more effectively the symptoms of knee osteoarthritis in females than general exercise.

Because each joint has a unique movement arc in relation to other joints, attention must be made while deciding which direction to modify; this is where the Concave Convex Rule comes into play.

Isometric exercise is a type of static exercise in which muscles contract to produce force without causing significant changes in muscle length or obvious joint movement [10].

MATERIAL AND METHODOLOGY:

Objective: To study the effect of static strengthening and Maitland mobilization on pain, functional outcome, and strength in osteoarthritis knee in females.

Study design: Quasi- Experimental

Sampling method: Purposive Sampling

Duration of study: 6 months

Source of data: Out patients from the physiotherapy department of Chhatrapati Shivaji Subharti hospital, Meerut, Uttar Pradesh (Referred from Orthopedics Department)

Sample size: A total of 78 participants were selected for the study based on the inclusion and exclusion criteria, whereas 4 dropped out after a few days of treatment.

Inclusion criteria:

1) Only females
2) Age 40-70years
3) Unilateral Osteoarthritis knee.
4) Numeric pain rating scale greater than or equal to 5.

Exclusion criteria:

1. Acute exacerbation in or around knee joint
2. Traumatic injury or surgical intervention to knee joint within 6 months of study
3. Subject with psychiatric disorders or illness
4. Peripheral vascular disease
5. Tumors/malignancies/infection associated with knee joint
6. Lower limb metallic implants
7. Impaired thermal sensation over knee

TOOLS USED IN THE STUDY:

Knee injury and osteoarthritis outcome score (KOOS) [Annexure A], the Oxford scale [Annexure B], The Numeric pain rating scale (NPRS) [Annexure C].

PROTOCOL:

1. Patient will be assessed and selected as per the inclusion criteria and exclusion criteria.
2. Initial reading of Knee injury and osteoarthritis outcome score, the oxford scale for MMT of Hip Abductors, Numeric pain rating scale will be noted.
3. The patient will be given strengthening exercise for hip abductors:

Clamp Shells- 2 sets of 10 repetitions with 5 second hold. Resistance will be given by therapist

4. The patient will be given Grade 3 and 4 of Maitland mobilization. Maitland mobilization will be given thrice, each for a duration of 1 minute with a break of 30 seconds between each minute.

A] Knee Flexion Mobilization Ventral Capsule Roll Glide (Tibiofemoral posterior glide)

B] Knee Extension Mobilization Dorsal Capsule Roll Glide **(**Tibiofemoral anterior glide)

The treatment will be given twice a week for 3 weeks.

5. The outcome measures will be recorded after 3 weeks

Patients were instructed not to modify their ADLs and not to take part in additional forms of physical activity while the study lasted.

RESULTS: The data were compared using paired t-test. The findings showed significant statistical significance of the observed difference in each outcome measure with $p<0.001$.

KOOS. Symptoms	**Mean ± SD**	**Confidence Interval**	**p value**	**t**	**df**
Pre	43.51014±11.63	(-17.82, -13.58)	p= 1.32e-23 that is p<0.001	-14.757	73
Post	59.20608±10.42				

KOOS. pain	**Mean ± SD**	**Confidence Interval**	**p value**	**t**	**df**
Pre	40.54730±12.02	(-34.27, -27.41)	p= 1.9e-28 that is p<0.001	-17.923	73
Post	71.38919±14.84				

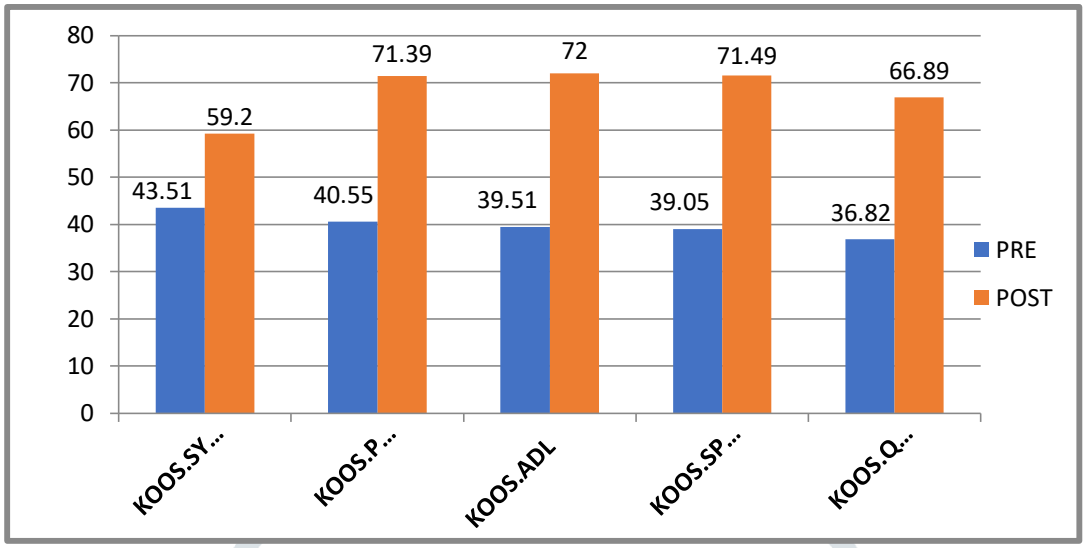
KOOS.ADL	**Mean ± SD**	**Confidence Interval**	**p value**	**t**	**df**
Pre	39.51351±12.47	(-35.91, -29.07)	p=7.11e-30 that is p<0.001	-18.927	73
Post	72.00405±15.03				

KOOS. Sports/rec	Mean± SD	Confidence Interval	p value	t	df
Pre	39.05405±16.85	(-36.05, -28.81)	p=2.34e-28 that is p<0.001	-17.861	73
Post	71.48649±16.73				

KOOS.QOL	Mean ± SD	Confidence Interval	p value	t	df
Pre	36.82432±17.30	(-33.64, -26.48)	p=1.04e-26 that is p<0.001	-16.744	73
Post	66.88554±17.40				

MMT	Mean ± SD	Confidence Interval	p Value	t	df
Pre	2.986486±0.67	(-1.27, -0.97)	p=2.42e-23 that is p<0.001	-14.595	73
Post	4.108108±0.39				

NPRS. Pain	Mean ± SD	Confidence Interval	p Value	t	df
Pre	6.743243±1.23	(2.04, 2.44)	p=1.4e-34 that is p<0.001	22.516	73
Post	4.500000±1.13				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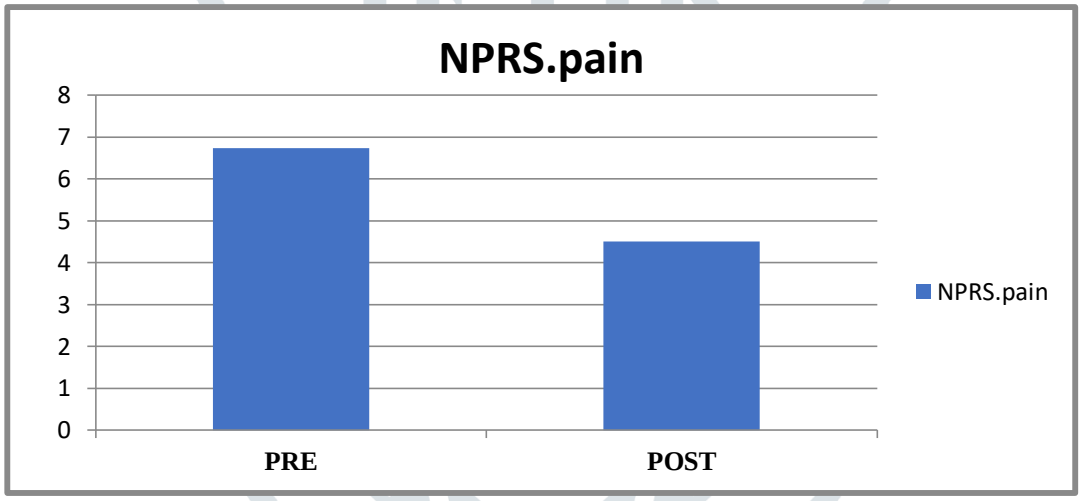
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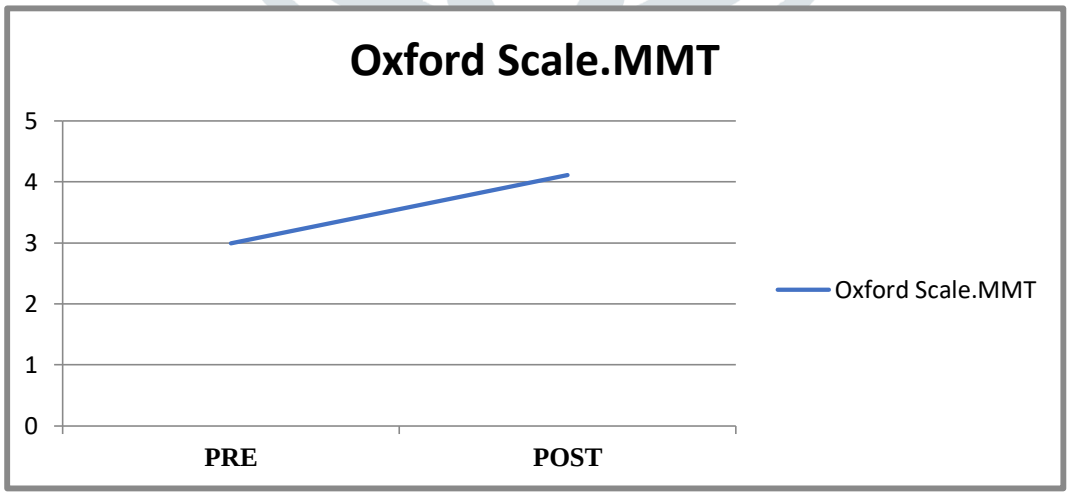
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DISCUSSION:

Osteoarthritis is a complicated and multifaceted joint disease that primarily affects the knees.

Mobilizations have a variety of positive consequences, including stimulation of peripheral mechanoreceptors, suppression of nociceptors, and an increase in synovial nutrition, all of which contribute to pain reduction [32, 33].

Sambajon*et al* in 2003 [34] stated that Local mechanical disturbances may affect the chemical environment and, as a result, the concentrations of inflammatory mediators, thereby reducing pain [34].

The oscillatory movements used during mobilization are thought to have mechanical effects such as collagen realignment, increased fiber glide, and adhesion breakup, all of which aid in the restoration of normal mobility [35].

Strengthening activities are commonly used to treat OA knees. The hypothesis was that the gluteus medius muscles influenced the external knee adduction moment during level walking [36].

Women are more likelyto be diagnosed with knee osteoarthritis, which could be due to hormonal changes or excess weight.

Isometric training is found to be effective in increasing range of motion.

Lower the knee adduction moment, lower the hip abduction strength, potentially reducing discomfort and improving function in OA knee patients.

CONCLUSION:

Despite being one of our population's most studied and frequent conditions, knee osteoarthritis still lacks aclear mechanism or a single most effective treatment for the symptoms and deterioration of it causes. Exercises in the early phases are a helpful therapy for these people, and all medical organizations suggest it.

Treatment of OA is aimed at reducing pain and disability to improve function and quality of life [39-41].Manual physical therapy, which includes customized exercise plans, provides a higher level of benefit that lasts up to a year.

For individuals with knee osteoarthritis, isometric strengthening exercises can be an important part of a treatment strategy aimed at reducing pain intensity, improving joint functioning, and enabling activities of daily living.

Out of the several manual therapies, Maitland manual therapy may be an effective supplementary intervention [37] in the management of symptoms in KOA. Maitland manual therapy applies both accessory and physiological technique and varies the performed Grades from I to IV. Grade I, applied with accessorytechnique, and Grade II is only utilized in pain-free positions with supplementary or physiological techniques to relieve severe pain. Grades III and IV are conducted in end-range to restore full range of motion using either accessory or physiological approach [38].

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